AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1.   (canceled).

2.   (currently amended): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein (b) comprises connecting pixels having a same level on direction maps of a plurality of directions to obtain the first list of straight lines.

3. (original): The method of claim 2, wherein the step (a) comprises:

(a-1) obtaining a distance map by performing a distance transform on the input image; and

(a-2) extracting the skeleton from the obtained distance map.

4. (previously presented): The method of claim 2, wherein the step (b) comprises:

(b-1) thinning the extracted skeleton; and

(b-2) extracting the first list of straight lines by connecting respective pixels within the thinned skeleton.

5.   (original): The method of claim 2, wherein the step (b) comprises:

(b-1) making a list of starting points and ending points of the connected lines; and

(b-2) obtaining the first list of straight lines by a straight line combination of the extracted

straight lines;

and the step (c) comprises:

(c-1) determining the second list of straight lines, obtained by normalizing the first list of

straight lines based on the maximum distance between ending points of respective straight lines,

as the shape descriptor.

6.   (previously presented): The method of claim 3, wherein the distance transform is

based on a function indicating respective points within an object with the minimum distance

value of the corresponding point from a background.

7.   (original): The method of claim 3, wherein the step (a-2) comprises: obtaining a

local maximum from the distance map using an edge detecting method.

8.   (currently amended): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted

skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of

straight lines as a shape descriptor,

wherein the step (a) comprises:

(a-1) obtaining a distance map by performing a distance transform on the input image;

and

(a-2) extracting the skeleton from the obtained distance map,

the step (a-2) comprises: obtaining a local maximum from the distance map using an edge detecting method, and

~~The method of claim 7, wherein~~ the step (a-2) comprises:

(a-2-1) performing a convolution using a local maximum detecting mask of four directions to obtain the local maximum.

9. (original): The method of claim 8, after the step (a-2-1), further comprising:

(a-2-2) recording a level corresponding to a direction having the greatest size on a direction map and a magnitude map.

10. (original): The method of claim 2, wherein the input image is a binary image.

11. (currently amended): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein the step (b) further comprises:

(b-1) thinning the extracted skeleton; and

(b-2) extracting the first list of straight lines by connecting respective pixels within the thinned skeleton, and

~~The method of claim 4, wherein~~ the step (b-1) comprises:

leaving a pixel having the greatest size in a direction rotated by 90-degrees from the

corresponding direction on the direction map, and removing the rest of the pixels.

12.   (currently amended): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted

skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of

straight lines as a shape descriptor,

wherein the step (b) comprises:

(b-1) thinning the extracted skeleton; and

(b-2) extracting the first list of straight lines by connecting respective pixels within the

thinned skeleton, and

~~The method of claim 4, wherein~~ the step (b-2) comprises:

using the direction map of four directions, and making a list of starting points and ending

points of respective line segments by connecting pixels having the same level on the direction

map.

13.   (original): The method of claim 5, wherein the step (b-2) comprises:

performing a straight line combination by changing threshold values of an angle between

the straight lines, a distance, and a length of a straight line from the obtained first list of straight

lines.

14.   (original): The method of claim 13, wherein the straight line combination is repeated until the number of remaining straight lines becomes equal to or less than a predetermined number.

15.   (withdrawn): An image searching method, wherein a method for searching for images having similar shapes to a query image comprises:

(a) obtaining a list of straight lines from a shape descriptor of a query image;

(b) comparing the list of straight lines of a shape descriptor of a detected image with the list of straight lines of the shape descriptor of the query image, and obtaining dissimilarity; and

(c) detecting images having similar shapes to the query image based on the obtained dissimilarity.

16.   (withdrawn): The method of claim 15, wherein the step (b) comprises:

(b-1) measuring distances between ending points of the straight lines forming a skeleton; and

(b-2) determining the sum of minimum values of the measured distances as the dissimilarity.

17.   (withdrawn): The method of claim 16, wherein the step (b-1) comprises:

when Q is a straight line for detecting, M is a detected straight line, S is a starting point of any straight line, E is an ending point of any straight line, N_Q is the total number of the straight lines which the shape descriptor of the query image has, N_M is the total number of the straight lines which the shape descriptor of the detected image has, and N is $N = \min\{N_Q, N_M\}$ calculating distances between ending points of the straight lines forming the skeleton according to

$$D_{1k} = \frac{min}{ij}\left\{\left\|Q_{S_i} - M_{S_j}\right\| + \left\|Q_{E_i} - M_{E_j}\right\|\right\} D_{2k} = \frac{min}{ij}\left\{\left\|Q_{S_i} - M_{S_j}\right\| + \left\|Q_{E_i} - M_{E_j}\right\|\right\}$$

and the step (b-2) comprises:

measuring dissimilarity using a dissimilarity specific function defined as

$$D = \sum_{k=0}^{N-1} min\{D_{1k}, D_{2k}\}.$$

18.   (withdrawn): The method of claim 17, wherein a similarity measurement is performed according to the steps (b-1) and (b-2) at regular intervals of a rotating angle to obtain a value which is not changed by the rotation.

19.   (withdrawn): A dissimilarity measuring method, wherein a method for measuring dissimilarity between images indexed using a shape descriptor formed on the basis of a skeleton comprises:

(a) obtaining a list of straight lines from a shape descriptor of a query image; and

(b) comparing a list of straight lines from a shape descriptor of a detected image with the list of straight lines of a shape descriptor of a query image, and obtaining dissimilarity.

20.   (previously presented): The method of claim 2, wherein the step (a) comprises:

(a-1) obtaining a map of the input image; and

(a-2) extracting the skeleton from the obtained map.

21.   (cancelled).

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